

to adjust for such impairments in order to restore unimpaired display of visual information. Conversely, when the deformation (or deformations) 17 is (are) eliminated by unfolding of the display unit 11, adjustments made to accommodate such deformation(s) 17 may be discontinued. As used herein, references to “folding” of the display unit 11 shall mean folding the display unit 11 from a substantially planar (or default) configuration to a folded configuration, or from a folded configuration to a planar configuration, or between different degrees of folded states of the display unit 11.

[0016] According to one example embodiment, the deformation 17 of the display includes that area of the display unit 11 that is curved, compressed, pinched and/or has a discontinuity where the plane of the display changes from one orientation to another partially or fully transverse orientation on the other side of the deformation 17. According to various other example embodiments, the foldable display unit 11 and/or device 12 may be foldable along any line or location or orientation of the display unit 11 and/or device 12, or only along predetermined lines or axes. In one embodiment, described in more detail below, deformation of visual information in an area of the display is avoided by automatically dividing the display area into display sub-areas, for example areas 11A and 11B (which may be thought of as display areas on opposite sides of the fold along axis 15), that do not contain the deformation 17, and moving the display of visual information from the original display area into the sub-areas.

[0017] Referring again to FIG. 1A, a display control unit 14 receives display data 16 from a data source 18 and produces one or more display control signals 20 for application to one or more display control inputs 24 of display device 12, in order to produce visual information on the display unit 11 of display device 12. Display unit 11 is operative to display (i.e., is capable of displaying) the visual information, based at least in part on display data 16. In general, display data 16 conveys or holds or encodes the visual information to be displayed. As further illustrated in FIG. 1A, display control unit 14 includes at least one additional input 26 to receive a fold signal 30, from fold detection system 54, that is indicative of the folding or unfolding of at least some portion of display unit 11, and optionally the location(s) of fold deformations. Display control unit 14 receives display data 16 and at least one fold signal 30, indicative of a fold in display unit 11, and generates as output one or more display control signals 20 that cause display unit 11 to display the visual information. Signal 30 may take the form of one or more analog signals, or digital signals or data. Fold detection system 54 receives one or more load signals 51 from load cells 50, shown and described with respect to FIG. 2, used to detect a fold in the display unit 11.

[0018] According to one embodiment, display control unit 14 takes the form of an integrated circuit responsible for generating the timing of display control signals 20, such as, for example, horizontal and vertical synchronization signals, and a blanking interval signal. According to another example embodiment, the data source 18 is a video random access memory (RAM), or other storage device, such as but not limited to a magnetic or optical storage device, or a processing device. According to still another example embodiment, display control unit 14 is a video display processor (VDP). According to another example embodiment, the display control unit 14 is a video display controller that may take the form of a video shifter, a cathode ray tube controller (CRTC), a video interface controller, or a video code processor. According to still other example embodiments, the display control

unit 14 may be mounted on a central processing unit (CPU) motherboard, or integrated into a microprocessor chip. According to other example embodiments, the display control signals 20 may be analog or digital, for example but not limited to component video, digital visual interface (DVI), video graphics array (VGA) or high-definition multimedia interface (HDMI) video control signals.

[0019] According to one example embodiment, the display system of the present technology includes data source 18, display control unit 14, display device 12 (including any fold detection devices associated therewith) and fold detection system 54, as illustrated for example in FIGS. 1A, 1B and 2. In another example embodiment, the display system may include fewer than all of these components, such as, in one embodiment, the system may only include display control unit 14, or, in another example embodiment, the system may only include fold detection system 54 or, in yet another example embodiment, the system may only include fold detection system 54 and display control unit 14. Further, the methods and computer program products described herein may also, in alternative embodiments, include or encompass only the operations or functionality of the alternate system embodiments described herein.

[0020] As illustrated schematically in FIG. 2, according to one example embodiment, the fold signal 30 (shown in FIG. 1A) may be obtained or derived from one or more fold detection devices, which in one example embodiment comprise load cell(s) 50, mounted or integrated with display unit 11 and/or display device 12, that produce fold detection signals, for example in one embodiment, load cell signal(s) 51 (also shown in FIG. 1A). According to another example embodiment, the load cell(s) 50 are bonded onto display unit 11 and/or display device 12 such that folding of the display unit 11 and/or display device 12 produces corresponding analog (or, in an alternate embodiment, digital) load cell signal(s) 51 in one or more of the load cell(s) 50. The load cell signal(s) 51 from load cell(s) 50 are conveyed on signal paths 52 to the fold detection system 54 (FIG. 1A) taking, for example, the form of a computing platform having a programmable computer or other electronic device capable of interpreting the signal(s) 51 to generate fold signal 30. According to one embodiment, signal(s) 51 are analog signals, and are converted to digital signals or data and processed in fold detection system 54 to determine the location of folds in the display device 12. Alternatively, separate analog to digital circuits may be employed to digitize the signal(s) 51, if in analog form, prior to delivery to fold detection system 54.

[0021] According to another example embodiment, at least some of load cell(s) 50 are oriented fully or partially transversely to one another in order that folds in display unit 11 and/or device 12 can be ascertained in both directions or diagonally using the signal(s) 51. In still one more embodiment, described further below with respect to method 100, fold detection system 54 determines the approximate or exact degree of folding of display unit 11, or alternatively only whether the display unit 11 is folded or not, and if more than one fold axis is possible, the location of the fold axis. (In the event more than one fold axis is possible, fold detection system 54 may determine the location of each axis, as well as the degree of folding at each axis.) In one example embodiment, the determination of the foregoing is made using the relative magnitude of the signals from load cell(s) 50. In one embodiment, the signal(s) 51 generated from load cell(s) 50 are proportional to or at least can be correlated to the amount